STATE OF IOWA
DEPARTMENT OF COMMERCE
BEFORE THE IOWA UTILITIES BOARD

IN RE: INTERSTATE POWER AND LIGHT COMPANY	DOCKET NO. EEP-2012-0001
MIDAMERICAN ENERGY COMPANY	DOCKET NO. EEP-2012-0002
BLACK HILLS/IOWA GAS UTILITY, LLC, d/b/a BLACK HILLS ENERGY	DOCKET NO. EEP-2013-0001

ERRATA TO NET-TO-GROSS PLAN

The Office of Consumer Advocate ("OCA"), a division of the Iowa Department of Justice submits this Errata to the final report on net-to-gross plan filed in the above captioned dockets on September 1, 2016. The original filing inadvertently omitted Attachment A, which is attached to this filing.

Respectfully submitted,

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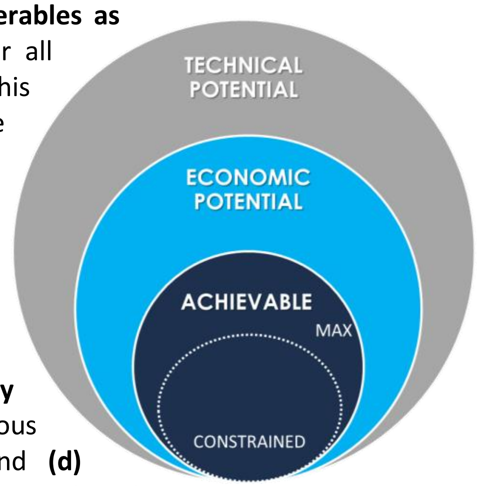
OFFICE OF CONSUMER ADVOCATE

ATTACHEMENT A: STATEMENTOF WORK



Our proposed methodology follows all of the 13 tasks and deliverables as specifically requested in the RFP. Since this may be the case for all respondents to this solicitation, we would like to call attention in this section not only to the tasks themselves, but to the *way in which* the Dunsky Team approach will provide added value to IUA members.

Indeed, our approach is designed to create ***lasting benefits*** for IUA members, many of which are likely unique to our proposal. These benefits stem from the emphasis we put on the client perspective, which in this case means an emphasis on **(a) transparency and post-project usability** (boundless scenario analyses and a usable, ongoing work tool free of black boxes), **(b) quality and highly defensible results** (focus on primary research and rigorous methodology), (**c) effective communications** and testimony, and **(d) effective client-focused project management.** In addition, we bring thought leadership in key areas of IUA interest (e.g. financing), as well as strong stakeholder and regulatory experience.

TRANSPARENCY AND DIRECT USABILITY

In contrast to the "black box" approach of some of our competitors, **we will provide the IUA with Dunsky's transparent, user-friendly model for continued use after the project's completion** (see the next section for a more detailed description of our model). We recognize that things change over time – avoided costs, measure costs, incentives, cost of capital, etc. – and so our model allows our clients to directly change key inputs; to test key assumptions; to run scenario analyses; all without the need for additional support. Throughout our research, we will also prioritize public sources of information to improve transparency of the process and all sources of data will be made available for review by the IUA and clearly documented for future reference.

We are confident that our approach will result in a highly robust potential study for Iowa, designed to be relevant, valuable *and usable* for years to come.

QUALITY RESULTS THROUGH EFFICIENT USE OF PRIMARY RESARCH

A potential study, and the associated model, is only as good as the foundational data and model inputs on which it is built. Using dated or faulty assumptions regarding baseline market conditions will reduce the accuracy of estimates of energy efficiency potential, dramatically limiting the quality and value of the results. The IUA last incorporated primary data collection in the 2008 potential study. Since then, markets have changed significantly.

It is likely that the IUA received competing proposals for this work outlining approaches offering substantially less primary research than we suggest, arguing that market conditions are well understood, or can be accurately estimated based on the professional judgement of experienced professionals or extensive databases of baseline conditions and model inputs compiled from other studies. While their approach no doubt offers reduced project costs, we urge the IUA to consider the associated reduction in reliability, accuracy and value, and contrast that with the importance of “getting it right” at this critical stage.

In contrast, strategic use of current, accurate and reliable primary data is the cornerstone of our approach, using primary data to directly inform key model assumptions. Forecasting potential for savings begins with disaggregating current energy use across existing market segments, building types and end use categories. This process requires detailed information regarding the types, age, capacity, efficiency, and characteristics of existing equipment and facilities, and supports subsequent analytic phase of the model. Our approach described below specifically seeks to avoid generalities and inaccuracies in the underlying model inputs that would propagate throughout the analysis and undermine the very purpose of the effort.

COMPELLING TESTIMONY & COMMUNICATIONS

We recognize that strong analytics are only half the battle. As a result, we place strong emphasis on quality communications, both in written deliverables *and in any direct engagement with stakeholders and the regulator.* As with all similar projects, we also will bring to the table deep *and successful* experience in regulatory proceedings, including formal cross examination and informal or semi-formal sessions with stakeholders.

EFFECTIVE PROJECT MANAGEMENT

Experience is clear: As with communications, solid technical work can still lead to a failed project in the absence of effective project management. Dunsky’s clients regularly emphasize the quality of our project planning and management, which is rooted in a highly developed Project Management Plan, use of a skilled and experienced Project Manager, and internal processes designed to incent strong client satisfaction.

We believe this is a pre-condition the project for success.

POTENTIAL ASSESSMENT METHODOLOGY

Step 1: Base Case– Primary and Secondary Data collection

The objective of a potential study is to estimate future savings opportunities relative to baseline demand. The Dunsky Team will forecast reference energy use for 2018-2027, using the base case year as a starting point.

Base case disaggregation will be informed by data specific to the IOUs’ service areas where available. The Dunsky Team will consider all the available data sources, and will complement these with primary research and/or data from secondary sources where needed. Data sources to be considered include:

- Most recent utility sales data;
- IOU evaluation studies and reports
- Residential end-use survey results
- Measure equipment saturation studies
- Other baseline studies (types and efficiency of equipment in existing and new buildings)
- End-use disaggregation data

- Secondary research, government and utility surveys of manufacturers and Team experience with Iowa and/or similar regions

Our team will proceed to identify gaps and, with its substantial on-the-ground experience in Iowa (see inset box), identify those deemed most critical to ensuring reliable results in a given market segment. This will allow us to direct funds efficiently and effectively to augment data with additional primary research, in the form of **site visits and/or surveys** as outlined in the Primary Data section that follows.

These data sources will help determine saturation data, equipment type, energy efficiency levels, adoption barrier levels, and the distribution of key equipment and building characteristics (e.g. numbers of units installed per facility for lighting, motors, HVAC, compressed air). The Dunsky Team's base case will be disaggregated by utility, by sector and sub-sector, and by key end-use.

Step 2: Measure Survey (Characterization)

The Dunsky Team will review the measures included in the forthcoming Iowa Technical Reference Manual (TRM) and **develop a database of electricity and natural gas energy efficiency measures** to be included in the study. It is our understanding that the TRM is not currently available, but will be made available to the selected contractor for the purposes of completing this study. We will also review the Custom Project Savings Verification reports as a starting point for the development of commercial and industrial (C&I) measures and measure data. In addition to standard measures, our analysis will account for custom measures that might be installed in larger C&I facilities. Furthermore, in order to ensure a comprehensive starting point, and depending on the contents of the TRM, we may propose to add additional measures. Our experience suggests that while some potential studies exclude measures at the outset that are deemed unlikely to pass subsequent economic screening, doing so is unwise: it limits the benefits of scenarios analyses, hampers the accuracy of results when key inputs (e.g. gas prices, avoided capacity costs, etc.) later change, and ultimately leaves clients open to critique at regulatory hearings. **The Dunsky team will emphasize inclusion of a set of "blue sky" measures to avoid these early-stage biases**.

> BASE CASE DEVELOPMENT –
> **THE VALUE OF ON-THE-GROUND EXPERIENCE IN IOWA**
>
> All base case assessments face two related risks: (1) generic analyses that rely too heavily on information from other regions, and (2) inefficient use of limited research funds because of unsubstantiated assumptions about which data gaps matter most.
>
> Michaels Energy brings long-standing experience delivering and evaluating commercial and industrial, and to a lesser degree residential programs, across Iowa. This ground-level experience will provide crucial value to interpret data, make critical judgment calls, and determine the most effective use of funds for additional, primary research. As a result, our base case and the ensuing results will reflect Iowa's - and no one else's - context.

The measure database will include the following items **for each measure to be included in the study:**

- *Type and Description* (applicable to new construction, natural end-of-life replacement, early retirement, retrofit, operational/maintenance/controls, or whole-building/whole-facility)
- *Unit Savings or algorithm* (base load or peak gas and electricity savings, as well as water and other quantifiable non-energy benefits)
- *Incremental Cost* (including future cost trends, where warranted)

- *Effective Useful Life*
- *Market Barrier Level* (feeds into the adoption model)
- *Applicable Sector, Segment and End Use*
- *Current Market Saturation*
- *References* to all data sources

In order to assess these technologies, we will develop assumptions pertaining to evolving codes and standards, compliance levels, and future changes to measure baseline. We will also seek to identify emerging and future technologies that may become commercially viable within the Potential Assessment period, but that may currently be absent from the TRM.

Step 3: Qualitative Screening of Measures

Based on the measure characterization, we will screen the list of measures considered for inclusion within the potential assessment. In particular we will seek to remove measures that are at risk of having achieved or being near full market penetration or maturity, or measures that may not be technically or commercially viable (as opposed to available) or appropriate for Iowa. The retained list should encompass the universe of potentially-relevant, known and *forward-looking* measures and options for Iowa.

Step 4: Phase-in Technical Potential

Technical potential is the theoretical maximum savings opportunity, disregarding constraints such as cost-effectiveness and market barriers. In Iowa's case, this should exclude early replacement and retirement opportunities, which are to be addressed in the subsequent *achievable* potential analysis.

At this initial stage, one critical decision involves treatment of competing efficiency measures. The Dunsky model can take one of two approaches to this issue: *winner-takes-all*, or *competition groups*. As a default, for each sub-sector/end-use, the measure procuring the most energy savings per unit will be selected, maximizing overall energy savings. Alternatively, **our model can introduce competition groups** at the technical level.[1]

Step 5: Economic Potential

Economic potential is determined by screening technical potential measures – or bundles of measures – against standard cost-effectiveness tests. It disregards market barriers to adoption.

Our potential model calculates two types of cost-effectiveness ratios. The **Societal Cost Test (SCT) is used to screen measures** for the Economic and Achievable potentials, while **the Participant Cost test (PCT) is an input (among others) for measure adoption rates**. SCT calculations will be customized to meet Chapter 35 Guidelines and IOU current practice, which use an externality factor of 10% and 7.5% (for electrical and natural gas respectively) at the program and portfolio levels, and a threshold of 1.0 for all programs except those targeting low-income customers.

[1] This represents somewhat of a departure from the pure technical potential concept by introducing a non-technical constraint (i.e. consumer preferences or choice when competing technologies are available).

Key inputs for the economic potential modelling will be obtained from the IOUs to the extent that they are available, including: avoided costs, discount rates, marginal consumer rates (for the PCT), and any other component that utilities may use.

Alternate test criteria can be added to the model for additional sensitivity analyses if desired by IUA, and a toggle switch can allow the user to easily decide which cost-effectiveness criteria to use. Our model also allows for multiple scenarios to test the sensitivity to varying discount rates, measure costs, marginal rates, avoided costs, externality levels, etc. Adders and alternate values can easily be modified by users directly on the dashboard to immediately obtain complete results for alternate scenarios.

Technical and Economic Potential deliverables include the assessed energy efficiency and demand response potentials by energy source, utility, sector, sub-sector (segment), and end-use, for each year in the forecast (2018-2027), as well as a discussion of results and comparative assessment of the results with previous potential assessment studies in Iowa and similar jurisdictions.

Step 6: Achievable Potential Scenario Assessment

The achievable potential can be defined as the amount of energy savings that can be achieved, assuming the aggressive programs are implemented with no budget constraints other than SCT-driven cost-effectiveness requirements. Our user-friendly model will produce an upper-bound "maximum" savings scenario, taking into consideration realistic market penetration rates over the study period, using the methodology described below.

IMPACT OF INNOVATIVE FINANCING

The IUA has called out the potential impact of financing on adoption of energy efficiency measures for specific treatment in the potential study. We concur: depending on specific program designs and approaches, financing programs such as PACE, OBR, OBF and others *can* boost adoption of certain (not all) measures.

Our model will allow the IUA to compare scenarios with and without financing programs, as well as the impact of the financing program features. This will allow for a clear understanding of the potential range of impact of various financing strategies on achievable potential.

Dunsky is among North America's thought leaders on innovative financing programs and the ways in which they can impact cost-effective savings opportunities. Our work in covers financing program design, evaluation and strategy development in California, Connecticut, Rhode Island, Maine, and North Dakota. In addition to our industry-leading work we have published and presented extensively on this topic at leading conferences across the U.S, and we have advised on and designed innovative financing programs for clients across Canada.

Moreover, **Opinion Dynamics is a market leader in evaluating financing programs**, and we have worked together in California, Connecticut, Rhode Island and Maine to review and evaluate many best in class programs.

PROGRAM ARCHETYPES

A set of best-in-class program archetypes will be developed based on our Team's experience, best practices, discussion with the IUA, and knowledge of existing DSM programs in Iowa (as well as similar regions). We will define broad strategies, incentive levels, cost structure, and applicable measures, and those measures will be mapped into the potential model. We will assess an adequate ramp-up period for new or revised archetype programs. Our general bottom-up approach at the measure level will be used to obtain costs, savings and average persistence of energy savings at the program level by aggregating measures by program archetypes and using program assumptions such as incentive levels and administration costs.

Program archetypes will be designed to **capture all special programs defined in Chapter 35**, including low-income programs and tree planting. In addition, optional **financing programs will be built into the analysis** and included in the sensitivity options (see inset box). Financing efforts will be designed to cover such options as residential and commercial PACE, public building financing, and on-bill financing (OBF) or -recovery (OBR).

REFINED ADOPTION RATES

Over time, Dunsky has developed a sophisticated adoption model that we believe best captures likely market uptake of potential measures. Rooted in the U.S. DOE's adoption curves, our model bases adoption on a combination of customer cost-effectiveness – applied differently for each sector – and levels of market barriers.

Figure 1 presents a schematic view of resulting adoption curves. Five levels of barriers, to which measures are assigned based on market research or professional experience, define the maximum adoption curves. Different end-uses and segments exhibit different barriers.

We use five main steps to determine the achievable potential:

1. **Barriers:** Assign each measure, within each segment, to one of five adoption curves based on its assumed market barrier level (these can change over time where market transformation effects are anticipated);
2. **Drivers:** Assign cost-effectiveness metrics (e.g. payback, NPV B/C) to each sector based on market research into economic drivers or professional experience;
3. **Incentives:** Assign assumed incentive levels (these can be easily adjusted iteratively through the model)
4. **Economics:** Calculate customer cost effectiveness based on avoided rates and assumed non-energy benefits;
5. **Adoption:** Calculate resulting adoption rates

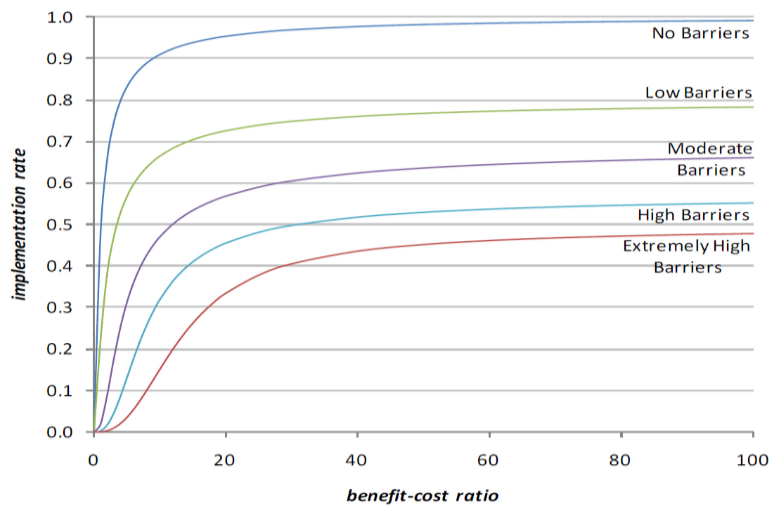


Figure 1: US DOE Adoption Curves

While our approach is rooted in US DOE's extensive work on adoption curves, it applies two refinements:

Refinement #1: choice of the cost-benefit criteria. The DOE model assumes that participants make their decisions based on a benefit-cost ratio calculated using discounted values. While this may be true for a select number of large, more sophisticated customers, research shows that many customers use much simpler estimates, including payback periods. This has implications for the choice and penetration of measures, since payback period ignores the value of money over time as well as savings after the break-even point has been reached. For these customers, short-term benefits are favored over long-term ones, creating a bias in favor of measures with a short effective useful life. Our model converts DOE's discount rate-driven adoption curves to equivalent curves for payback periods.

Refinement #2: ramp-up. Two key factors, measure awareness and program delivery structure, can in theory limit program participation, especially during the first few years, and result in lower participation than DOE's achievable rates would suggest. For example, a new home retrofit program that requires the enrollment and training of skilled auditors and contractors by program vendors, could take some time. We will apply a short-term adjustment, determined on a case-by-case basis using professional judgment and discussion with the IUA.

ACCURACY: COMPETITION GROUPS, CHAINED MEASURES AND OTHER FACTORS

To ensure accuracy, the Dunsky model introduces competition groups at the achievable potential level. Indeed, multiple measures that compete with each other for the same market can be selected if they are all cost-effective. In that case, each measure is attributed a share of the overall market based on its base adoption rate compared to other measures.

Unlike many other potential study models, our model also dynamically accounts for cumulative effects of "chained measures". For example, if insulation is added in a given building, savings from an efficient furnace installed afterwards in the same building will be reduced (as less heat is needed to meet the building's heating requirements). Based on user input, the model automatically calculates these cumulative effects according to measure screening and uptake under a given scenario.

Interactions between electricity and gas programs are also considered, in order to assess how program delivery may impact not only adoption rates, but also other potential effects such as program administration costs per participant. Other factors that the model can account for in assessing the achievable potential include:

- Aggressiveness of marketing efforts;
- Historic program experience;
- Experience in leading jurisdictions.

SCENARIO ANALYSIS

Base Scenario (report): As specified in the RFP, we will provide the IUA with a detailed analysis of an "upper-bound" scenario, i.e. maximum achievable savings from aggressive implementation of best-in-class programs.

Alternative Scenarios (report): Our model is built from the ground up to provide full flexibility in assessing multiple scenarios and sensitivities. To take advantage of this, we propose meeting with the UIA to determine together 2-3 alternative scenarios that we will produce and include in the final report. These could include, for example, a business-as-usual scenario that captures the constrained potential under a scenario where efficiency program funding is maintained at current levels over the reference period. Other options might include scenarios constrained by other budget levels; scenarios under which carbon values are added to current avoided costs (over and above or replacing current externality values); scenarios under which screening is applied at the sectoral rather than program level; or scenarios under which different avoided costs, discount rates, or other factors are assumed.

Alternative Scenarios (ongoing use): Our model recognizes that things change over time – avoided costs, measure costs, incentives, cost of capital, etc. – and is built to dynamically adjust to new parameters. We will provide the IUA with a licensed copy of the model – as well as associated training – that will allow you to change key parameters, to test key assumptions, and to run boundless scenario and sensitivity analyses, all without the need for additional support. Developed using the latest functionalities of MS Excel, the model provides superior support for future program design, regulatory hearing responses, and for improved scoping and preparation of the next Achievable Potential Study (see detailed model description below).

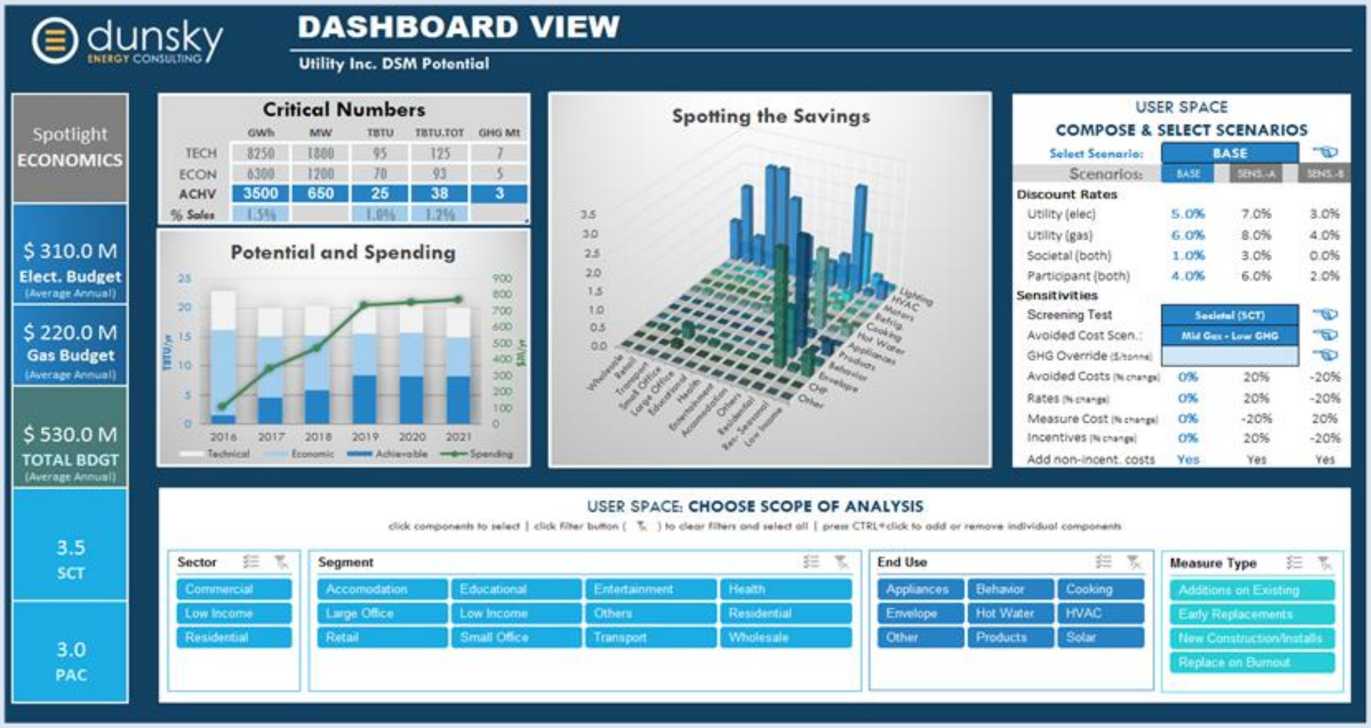
Leveraging our model's functionality and user-friendly platform, we will customize it at the outset to IUA's needs, based on discussion with you. This may involve adding new toggles to the dashboard, or other adjustments to maximize value to you.

DUNSKY'S USER-FRIENDLY MODEL

The Dunsky Team will apply our proprietary, user-friendly, transparent and fully adjustable potential model to estimate Iowa's electricity and natural gas energy saving potentials. We will adapt our model by incorporating Iowa's characteristics with respect to measure inputs, equipment saturation, and measure adoption assumptions, as well as all economic and related parameters. To meet the IUA's needs, our model will apply a state-wide potential model structure that can produce outputs at the specific levels of disaggregation required by the IUA, including separation of the gas and electricity potentials as well as disaggregation by IOU, sector, program type, end-use and measure. **We refer to this model in the task-by-task methodology outlined above and offer a snapshot of the dashboard page in** Error! Reference source not found. **below.**

At the end of the project, **we will deliver a fully-operational, Iowa-specific working version of the Excel-based model**, along with a license for its use. The model will include the study's assumptions and full Technical, Economic and Achievable potential scenario results, and will be calibrated and ready for IUA and IOU staff to perform further sensitivity analysis.

Figure 2: Dunsky Model – Sample Dashboard View *(fully customizable to IUA priorities)*



The Dunsky potential study model was developed specifically as an antidote to the traditional "black box" models developed by other firms. We believe that this provides greater value to the client, while putting you – not us – in the driver's seat with regard to future use. Our model offers the following features:

TRANSPARENT: Key input assumptions in the model are clearly defined and can be easily changed by IUA staff if needed to conduct sensitivity analysis, and adjust to changing market conditions (e.g. energy prices, economic growth) as well as recent program and evaluation results. All of the spreadsheet formulas are open and visible to the client, and are contained in one, easy to use workbook. As such, all assumption and results are easy to find, see and explain.

FLEXIBLE: Unlike the models of some of our competitors that only allow for flexibility in data visualization of a fixed model result, the Dunsky model is fully open to changes and further analysis by the client. The model allows for scenarios to determine the impact of key input variables (e.g. incentive levels, avoided costs, penetration rates, discount rates) on potential savings, program costs and cost-effectiveness estimates. This is designed as a significant improvement over other commonly applied potential models, and will allow IUA and IOU staff to use the model as an ongoing decision-aid tool, fully able to adapt to changing contexts, parameters, learnings and decisions.

USER-FRIENDLY: Our model was built from the ground up for ease of use by our clients. It notably provides a clear, attractive and *dynamic* input-output dashboard (see figure above) that is fully customizable to IUA's needs and priorities. This facilitates understanding of detailed potential results, and creates a valuable tool for testing program target setting and program design assumptions. Furthermore, the model is housed in a single workbook that is easy use, transfer and store, which offers significant advantages over models that employ a large number of connected workbooks that are difficult to handle and which require large computing resources to run. Although designed to be intuitive, we nonetheless offer three training sessions to IUA and IOU staff (one in-person and two web-based) to ensure that all are at ease using the model to perform scenario and sensitivity analyses as needed.

These front-facing functionalities are designed to enhance the value of the engine itself: a series of methodologies and algorithms that are built to withstand the toughest scrutiny (see earlier descriptions).

NET-TO-GROSS RESEARCH

The net-to-gross (NTG) assessment efficiency program portfolios will play an important role to inform the estimation of potential. As outlined in the *Iowa Energy-Efficiency Net-to-Gross Report,* evaluators use a variety of approaches to quantify program influence and establish the counter-factual; that is, to determine what would have happened in the absence of program efforts. These approaches typically require data from a variety of primary and secondary sources. Notably, the NTG assessment and potential forecast have different data requirements. For example, NTG assessments often require self-reported information from participating customers regarding program influence, while the potential study requires information regarding the penetration and saturation of various end-use equipment types at the customer segment level. Given these differences, our approach includes dedicated data collection efforts for each component of this workscope. Below we outline our data collection and analytic approach for the NTG assessment.

Overall Approach

Our proposed NTG approach is designed to address two main objectives: (1) provide NTG values needed for completion of the potential study and (2) begin primary data-based development of NTG methodologies, research instruments, and NTG factors that will help initiate Iowa's NTG transition and develop a foundation for future NTG research. Our approach thus balances the immediate needs of the potential study with Iowa's longer-term NTG objectives.

To ensure cost-effective use of funds, our NTG approach relies on secondary research, strategically limiting our investment in primary research to a few of the larger, higher impact programs. We will take a statewide approach in terms of methodology, i.e. employing the same instruments and NTG algorithms across "like" programs offered by the three IOUs, but an IOU-specific approach in terms of sampling – with the objective of providing results specific to each IOU at a fraction of the cost, if each IOU were to conduct separate research.

Proposed NTG Methods

We carefully reviewed the *Iowa Energy-Efficiency Net-to-Gross Report* published in September 2015 and the comprehensive set of potential NTG methods for each program type outlined therein. Based on our review, we propose we propose the following NTG research approaches to support the potential study:

1. **Primary data collection:** We will conduct primary research for three key programs offered by all three IOUs: Nonresidential Prescriptive, Nonresidential Custom, and Residential Prescriptive. Based our review of the information provided in the Iowa NTG report, we understand that these programs account the largest share of expected and savings from the portfolio or programs. We will field at survey of program participants to gather information required for the NTG analysis for these three high impact programs. We expect to design two separate survey instruments, one for the residential programs and a combined instrument for the nonresidential prescriptive and custom programs. We will target to complete a total of 360 interviews with residential customers and 480 interviews with nonresidential customers. These sample sizes will allow us provide NTG estimates with 10% precision at 90% confidence, by IOU and program.
2. **Secondary research:** For programs that account for a smaller share of program expenditures and expected savings, we will conduct leverage secondary data to support the analysis. Specifically, we will review NTG analyses of similar programs, offered in similar jurisdictions, that use the NTG methods recommended in the 2015 Net-to-Gross Report. This review will result in a "deemed" NTG value for each type of program informed by recent research. We will use this approach to develop NTG factors for the Residential and Nonresidential New Construction, Residential Assessments, Upstream Lighting, Commercial Energy Solutions, and Industrial Partners programs.
3. **Existing NTG values:** The 2015 Net-to-Gross Report identifies several programs for which net savings are currently available (Residential and Nonresidential Load Management, and Residential Behavior). For these programs, we will use the existing values.
4. **Deemed values:** The Net-to-Gross Report identifies several programs for which the expected net benefit of investment in NTG research is not positive. These are programs with a very small contribution to overall savings and/or programs focused on low income customers. For these programs, we will use a deemed value of 1.0.

Ideally, we would conduct primary research for all programs where such research is beneficial. However, we acknowledge that primary NTG research can be an expensive endeavor. We believe that our proposed approach strikes a good balance between the higher certainty and rigor of primary research and the realities of limited budgets. **Our approach will produce the**

highest rigor results for programs with the highest impact on overall portfolio outcomes and the greatest impact on our potential study results.

PRIMARY DATA COLLECTION

Strategic use of current, accurate and reliable primary data is the cornerstone of our approach. Primary data will directly inform key model assumptions. We will conduct primary research with three target market segments:

1) residential/low income customers,
2) C&I customers, and
3) market actors (e.g., contractors).

The sample sizes we have suggested for each market segment are sufficient to provide statistically valid results at a statewide level and allow for stratification by several dimensions of interest to the IUA (e.g., sector, climate zone, building type) while **supporting the development of utility specific estimates of potential**. We will work with the IUA to identify dimensions of interest by which to stratify our results and develop the most cost effective sampling strategy possible to satisfy those requirements. Upon project award, we will conduct a detailed review of customer usage and program participation data by segment and oversample as necessary to ensure we capture representative results that will support accurate potential modelling.

We will implement a multi-pronged research and data collection approach tailored to each market segment. Specifically, we will complete a mail/Internet survey and perform site visits to gather the data required for the residential study, complete a telephone survey and site visits in support of the C&I study, conduct qualitative telephone interviews with market actors, and perform secondary research to address data gaps where needed. **We have used this approach in all of our recent baseline/potential studies, including neighboring Illinois, and find that this strategy provides more robust penetration and saturation data and offers the flexibility needed to report key findings with more granularity (i.e., for specific sub-groups of customers)**. We note that approaches that rely solely on one form of data collection often fail to provide reliable estimates for the parameters of most

THE NEED FOR UPDATED IOWA MARKET DATA

The IUA last incorporated primary data collection in the 2008 potential study. Since then, markets have changed significantly. For example:

- **LIGHTING**: incandescent bulbs represented 72% of national residential lighting shipments in 2011 but only 28% in 2014, while CFL and LED shipments increased from 27% to 38% and <1% to 4%, respectively, during that period (with halogen and other bulb types making up the remaining share). Other recent research shows that the saturation of LEDs in the residential sector varies dramatically by state. In Iowa, more than 25% of commercial program participants indicated that LEDs were the predominant lighting type in their facilities, and linear tube LEDs are showing significant increases in market share in recent years.
- **CODES & STANDARDS:** The energy efficiency landscape in Iowa has also changed significantly due to codes and standards updates. Since the last time primary data was collected to support Iowa potential studies there have been two updates to the Iowa Energy Code. First in 2010 when IECC 2009 became effective, and again in June 2014 when IECC 2012 became effective. Additionally, with the release of IECC 2015 energy codes, Iowa will again be leading the adoption of this new standard. New codes and standards can significantly impact specific measures or whole customer segments. Our team knows that Iowa is proactive in adopting new energy codes, and has experience evaluating code and standards compliance in Iowa. This knowledge will allow the team to accurately capture how the next and future code changes will impact the potential study results.

These examples underscore the risk associated with a heavy reliance on secondary data from other jurisdictions or dated information from prior studies to inform the foundational model inputs used to estimate potential.

importance to an accurate forecast of potential. Our strategy of combining methods maximizes the benefits of collecting detailed and accurate information while achieving a sufficiently large sample to achieve our 90/10 accuracy and precision target.

Our Cost Containment Strategy

While primary data collection is essential to building the baseline for the potential model, we recognize that it can be costly. We believe **our data collection strategy offers a value-oriented balance between the reliability of the information collected, and the cost of acquisition.** While primary data is essential for accurate potential estimates, not all primary data is of equal importance in this regard. Penetration and saturation data, and information regarding the baseline of energy efficient equipment, is foundational to the study and are of the utmost importance to an accurate forecast of potential. As such, we will focus our primary research on these high-value parameters, including telephone and mail surveys with a representative sample of customers and site visits with a nested sample of survey respondents to ensure the accuracy of our results.

Site visits represent a major cost of the data collection process and travel time and coordination account for a large share of that cost. Because Michaels Energy currently has field engineers deployed in Iowa implementing programs for Alliant Energy and performing M&V for Black Hills Energy and MidAmerican Energy, **our team can conduct site visits more cost-effectively than any other team.** This boots on the ground knowledge will also provide valuable qualitative insight and observations that can further be leveraged to improve the accuracy and reliability of our potential estimates.

Optional Item: Interviews with market actors are also valuable to validate baseline estimates for efficient equipment, for determining current market shares, and for providing information on customers' willingness to invest in energy efficiency. However, we can gather this information through our research (surveys and site visits) with end use customers and suitable estimates that can be used to validate these model inputs are available through secondary research. As such, we include it as an optional task that we can scope and budget separately upon award of the study.

In addition to our robust primary data collection approach, we will leverage any existing data from the IOUs collected through their program evaluations. We find that these data can be useful in supplementing other datasets and for comparison to data collected through other means. While the majority of our research will focus on primary data collection, we find it useful to supplement the primary data with these secondary sources wherever possible to reduce costs and increase confidence in our research results.

Above all, we offer flexibility. Our recommended approach includes a robust primary research effort accounting for nearly half of our proposed budget. We have chosen this approach because of our understanding of the data currently available, and our fervent belief that the usefulness of the potential study is directly related to the specific inputs to our potential model. Having said that, upon project award, we are happy to discuss options for reducing (but not eliminating) the amount of primary research, and help the IUA consider the associated trade-offs of various lower cost strategies.

Residential Approach

We will conduct a mail/Internet survey in conjunction with in-home visits to gather the required baseline data. Whenever Opinion Dynamics develops and implements an approach for a market saturation and end-use penetration study, we weigh the pros and cons, and costs, of the various survey methods. Given the declining share or U.S. households with landline telephones and the potential length and complexity of a survey instrument designed to gather this information via telephone, our experience indicates that administering residential baseline surveys via mail/internet avoids potential biases associated with residential telephone surveys (e.g. under-representation of younger households) and cost of call production due to survey length.

Mail Survey: Target 1000 Returns

We will use our mail survey to collect detailed information on the electric and gas appliances and equipment listed in the RFP as well as building envelope characteristics, occupancy information, key energy use behaviors, and demographics. We will send out 5,000 survey booklets, targeting at least 1,000 returns. Customers targeted with a mail survey will have the option of completing the survey online through use of a unique PIN. As an incentive to participate in the research, we will conduct a sweepstakes to provide some set number of gift cards or similar incentive.

We will draw a random sample of households, stratified by residential class (i.e., single family, multi-family, and low income). Additionally, after examining the customer data, we will work with the IUA to select the most appropriate sampling dimensions given the available budget. These additional sampling dimensions may include IOU, annual energy usage, or fuel type. Based on these decisions, we will set quotas to ensure that our sample represents the population of residential customers. The large sample size of the mail survey will allow us to achieve results at the 10% precision at 90% confidence on a statewide level. As necessary, we will apply post-stratification weights to ensure that the survey's results are representative of Iowa's population.

Residential In-Home Site Visits: Target 100 Visits

To ensure the accuracy of the mail survey results we will conduct in-home visits with a sub-sample of survey respondents to validate the information reported on the survey and adjust the overall findings accordingly. **We have successfully employed this approach in numerous previous saturation and penetration studies, most recently in Massachusetts and Illinois.**

While on site we will collect penetration data similar to that collected in the mail survey, to verify/adjust the self-reported survey responses, and detailed saturation and efficiency information not reliably captured via mail survey efforts. Based on the survey responses and the verified site visit data for the same set of customers, we will develop adjustment ratios that we will then apply back to the entire set of survey respondents.

We will conduct in-home visits with a random nested sample of 100 mail/Internet survey respondents and may oversample groups with certain key end uses that are not well represented in the population (e.g., central air conditioning or electric space or water heating).[2] We will recruit customers for the in-home research via telephone, offering $50 as an incentive

[2] We will utilize Opinion Dynamics' call center to recruit potential site visit candidates in an effort to minimize costs.

to participate. We will design our sample of site visits to meet or exceed 10% precision with 90% confidence for each residential class at the statewide level.

Non-Residential Approach

As with the residential study, we will employ a two-pronged approach to collect the required penetration, saturation, and building data for the non-residential baseline study:

1) a telephone survey of 750 customers and
2) site visits to a subset of 150 customers.

The telephone survey sample size will ensure 90%/10% confidence/precision for 10 business customers segments to be defined in collaboration with the IUA and other relevant stakeholders, and assumes a 20% conversion rate for site visits, in line with other similar studies our team has conducted.

We will characterize existing equipment for 10 different business segments working with the IUA to define and combine the segments of highest importance (e.g., grouping the large office segment with the small office segment and the school segment with the college segment). We will design telephone survey to recruit customers for the on-site visits while also gathering basic facility characteristics and equipment penetration data. We will leverage the on-site visits to gather information regarding equipment characteristics that cannot be easily obtained via a telephone survey (e.g., efficiency levels and size/capacity) and saturation data. The data collected on-site will also be used to verify and, if needed, adjust the self-reported penetration data gathered via the telephone survey.

Non-Residential Telephone/Internet Survey: Target 750 completed interviews

We will use the telephone/Internet survey to collect penetration data for energy-using equipment within the end-use categories cited in the RFP, as well as information regarding building envelope characteristics, occupancy information, key energy-use behaviors, and firmographics. We recommend a telephone survey for business customers because we can readily tailor the questions to each customer's segment, and identify the most knowledgeable and appropriate survey respondent ensuring more accurate and complete data.

Commercial customer sectors are typically characterized by a highly uneven distribution of electricity usage, with the largest 5% of customers often accounting a large share of total usage, and the smallest 50% of accounting for a fraction of usage. To optimize the use of budget, and ensure that accurately characterize customers who account for a high share of usage, we will use a stratified sampling approach that oversamples large-usage customers. In addition, we limit site visits to customers in the lowest usage categories and may further sample by commercial business segment.

Non-Residential Site Visits: Target 150 Visits

We will use site visits to gather penetration data similar to that collected in the telephone/Internet survey to verify/adjust the self-reported survey responses and detailed saturation and efficiency information that we cannot reliably gather via telephone. Based on the survey responses and the verified on-site data *for the same set of customers*, we will develop adjustment ratios, where necessary, that we will apply back to the entire set of survey respondents. We will also collect energy use and behavioral information from these facilities to understand how the equipment is being used in commercial and industrial facilities.

While we believe that business customers are well equipped to answer questions about energy-using equipment at their facilities, we have found that supplementing telephone surveys with site visits yields the most accurate data. Using site visit data to adjust self-reported responses will provide us with considerably more certainty than relying on self-reported data only. We will conduct 150 site visits with a randomly selected nested sample of customers that respond to the telephone survey, a sufficient number to provide statistically valid results with 90% confidence +/- 10% precision at a statewide level.

DESCRIPTION OF MAJOR DELIVERABLES AND MEETINGS

Deliverables	Description	Target Week of:
Detailed Work Plan	Deliver final work plan incorporating comments and feedback from IUA, IOUs and NTG Oversight Committee	Sept 26, 2016
Market Baseline Study	Provide draft Market Baseline Study report to IUA and IOUs including results of primary and secondary data collection and model inputs	Mar 20, 2017
Draft NTG Report	Present draft report on NTG results to IUA, IOUs and NTG Oversight Committee to review and comment	Mar 20, 2017
Financing Memo	Describes role and best practices for financing programs and the proposed method for capturing impacts in the Potential Assessment	Mar 20, 2017
Draft Potential Assessment Results	Draft Technical and Economic Potential draft report Draft Achievable Scenario result	May 29, 2017
Final NTG Results Report	Deliver final NTG report to IOUs, IUA and NTG Oversight Committee	July 24, 2017
Final Report and User-Friendly Model	Deliver electronic work papers and spreadsheets and final Potential Assessment Report (hard and electronic copy) pursuant to 199 IAC 35.6(2)	July 24, 2017

Sample tables of contents and document/model images of the proposed outputs are provided in the appendix.

The table below outlines the key meetings between our team and the IUA. These will be complemented with regular contact among IUA representatives and our team, following a collaborative project delivery approach.

Formal Meetings	Description	Target Week of:
Kick off meeting	Update and approve work plan based on IOU and IUA feedback Establish communications protocol and primary data collection scope	Sept 1, 2016 (in person)
Status Meetings	Monthly updates with IOU/IUA representative(s) via telephone	First of each Month
Present Draft Model Structure	Present and provide details on the model, including its inputs, sensitivity fields and scenario functions. This is a chance for us to work the IUA to build in the analysis functionality that the IUA wishes to see, and define scenario(s) for the Achievable Potential assessment	Feb 20, 2017 (in person)
Present Market Baseline Study	Present draft Market Baseline Study report to IUA and IOUs including results of primary and secondary data collection and model inputs	Mar 27, 2017 (in person)
Present Draft NTG results to Oversight Committee	Present draft report on NTG results to IUA, IOUs and NTG Oversight Committee to review and comment Identify the appropriate level of NTG research to be conducted in the future to NTG Oversight Committee and the IOUs and	Mar 27, 2017 (in person)
Present Draft Potential Assessment	Present model assumptions/inputs based on primary and secondary research results, draft Technical and Economic potential results and	May 22, 2017 (in person)

Results	proposed Achievable Potential scenario inputs and assumptions (not results). Opportunity for IUA and IOUs to review and comment	
Present Final NTG results	Present final report on NTG results to IOUs, IUA and NTG Oversight Committee	July 24, 2017
Present Final Potential Assessment Results	Present Final Technical and Economic potentials and Achievable potential scenario(s) results.	July 24, 2017 (in person)
Training	Train IOUs and other parties on use of the Excel-based model, dashboard, sensitivity analysis and scenario testing functions	July/August, 2017 (in person)

FURTHER SCOPE PROVISIONS

1.1. Iowa Technical Resource Mannual Research: *To the degree feasible within the above described Primary Data collection efforts and available budget, The Dunsky Team will attempt to include high and medium TRM research items as they relate to market penetration and assessments, as per the VEIC list entitled "Iowa TRM Draft Measures - Recommended Evaluation Priorities", dated 4/14/2016. However, items requiring metering or long-term monitoring remain beyond the scope of the Potential Study Primary Data collection.*

1.2 IPL Residential and Non-Residential Program Evaluations: *The Dunsky Team will review the IPL 2014 Residential Energy Efficiency Program Evaluations and the 2014 Non-Residential Energy Efficiency Program Evaluations reports and identify any data that can contribute to the Potential Study as a secondary data source. We will inform the IUA if the results contained therein in can be used in place of any planned Primary Data collection efforts (as described in the Scope of Work) and adjust the planned scope of work accordingly, by either reducing the Primary Data collection efforts, or by increasing Primary and Secondary Data collection for other measures, sectors or markets*

1.3 Regulatory Hearings, Assessment Defense and Assistance: *The Dunsky Team offers to assist the IUA and its members to defend the Energy Efficiency Potential Study assessments during the regulatory hearing process as an additional scope of work, as per the hourly rates indicated in the detailed budget included in this contract.*